P P SAVANI UNIVERSITY

Fifth Semester of B.Sc. Examination

Dec.-Jan.-2020-21

SSCH3210-Applied Chemistry-Microscopy Techniques

07.01.2021, Thursday Time: 10:00 a.m. to 12:30 p.m. Maximum Marks: 60

Section-A (Total Marks - 20)

Q.1 Objectives (20 MCQ Compulsory-1 mark each) **(20)**

1 The first simple microscope was discovered by
- **A** Zaccharias Janssen
- **B** Hans
- **C** Both
- **D** None

2 Light microscope works in
- **A** Visible range
- **B** UV-range
- **C** IR-range
- **D** All of the above

3 Fluorescent microscope employs
- **A** Visible range
- **B** UV-range
- **C** IR-range
- **D** All of the above

4 A darkfield stop is placed underneath a condenser lens in _____
- **A** Phase Contrast microscopy
- **B** Dark field microscopy
- **C** Bright field microscopy
- **D** Compound microscopy

5 _____ is also known as Nomarski microscopy.
- **A** Differential interference contrast Microscopy
- **B** Dark field microscopy
- **C** Bright field microscopy
- **D** Compound microscopy

6 Resolving power of a microscope is a function of _____
- **A** Wavelength of light used
- **B** Numerical aperture of lens system
- **C** Refractive index
- **D** Wavelength of light used and numerical aperture of lens system

7 The greatest resolution in light microscopy can be obtained with _____
- **A** Longest wavelength of visible light used
- **B** An objective with minimum numerical aperture
- **C** Shortest wavelength of visible light used
- **D** Shortest wavelength of visible light used and an objective with the maximum numerical aperture

8 AFM stands for
- **A** Atomic face microscopy
- **B** Atmospheric face microscopy
- **C** Atomic force microscopy
- **D** Atmospheric force microscopy

9 In case of AFM, which of the following is correct
- **A** Cantilever with sharp tip scans the surface
- **B** Cantilever cuts the surface

C Cantilever burns the surface through laser beam
D None of the above

10 The force is measured in the range of _____ in AFM between the sample and cantilever.
A nN
B MN
C μN
D All ranges

11 HRTEM stands for
A High resistance transmitting electron microscopy
B High relative transmitting electron microscopy
C High-resolution transmission electron microscopy
D All of the above

12 The primary purpose of TEM is to examine
A the structure
B chemical composition
C electrical properties
D All of the above

13 Phase contrast arises when
A electrons of different phases interfere with each other after passing through the objective aperture
B electrons of different phases interfere with each other before passing through the objective aperture
C electrons of same phases interfere with each other before passing through the objective aperture
D electrons of same phases interfere with each other after passing through the objective aperture

14 The role of condenser lens in TEM is
A to establish low vacuum range
B for extracting and controlling electron beam in illumination system
C focusing the beam and illuminating the test subject under observation
D All of the above

15 The electron guns used in TEM is/are
A thermionic emission gun
B field emission gun
C Both
D None

16 _____ is used as an illuminating source in SEM and TEM.
A Slow moving electrons
B Accelerated light
C Accelerated electrons
D White light

17 The magnification power of an electron microscope is _____ than optical microscope.
A lower
B greater
C equal
D Can't be predicted

18 The interaction of electron beam with sample in SEM gives

A X-rays
B Backscattered electrons
C Auger electrons
D All of the above

19 The resolution is much _____ in TEM as compared to SEM.
A higher
B lower
C equal
D Can't be predicted

20 SEM produces _____ dimensional black and white images, while TEM produces _____ dimensional black and white images.
A Three, two
B Two, two
C Three, three
D Two, three

Section-B (Total Marks - 40)

Q.1 Short Notes (attempt all four- 3 marks each) **(12)**

A Write a short note on Polarized microscopy.
B State and explain different parts of a compound microscope.
C Discuss the importance of Phase contrast in TEM.
D Discuss the interaction of electron beam with the specimen in SEM.

Q.2 Explain in detail (attempt any four-7 marks each) **(28)**

A Discuss and compare different modes of AFM.
B Write a detailed note on Bright field microscopy and discuss its limitations.
C Give a Comparison Between Optical Microscope and Electron Microscope.
D Discuss the applications of TEM in different fields.
E Describe in detail the electron sources used in TEM.